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continuation-in-part of Application No. 08/166,153 filed
Dec. 14, 1993, which is a continuation of Application No.
07/991,421 filed Dec. 16, 1992, abandoned.

IN THE CLAIMS:

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1 26. (Amended) A projection exposure apparatus
2 comprising:
3 an illumination optical system in which an optical
4 device is disposed on an optical axis to form an annular
5 secondary light source with light from a first light source;
6 and
7 a projection optical system;
8 said illumination optical system satisfying the
9 following condition:

$$1/3 \leq d_1/d_2 \leq 2/3$$

10 wherein d_1 is an inner diameter of the secondary light
11 source and d_2 is an outer diameter of the secondary light
12 source.
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1 27. (Amended) A projection exposure apparatus
2 comprising:
3 an illumination optical system disposed on an optical
4 path along which light irradiated on a mask from an annular
5 illumination source passes; and
6 a projection optical system;

7 said illumination optical system satisfying the
8 following condition:

9
$$0.45 \leq \text{NA}_2/\text{NA}_1 \leq 0.8$$

10 wherein NA_1 is the numerical aperture of said
11 projection optical system, and NA_2 is the numerical aperture
12 of said illumination optical system determined by the outer
13 diameter of said annular illumination source;

14 said illumination optical system including an optical
15 device disposed on the optical axis to change a value of
16 NA_2/NA_1 .

1 28. (Amended) A projection exposure apparatus
2 comprising:

3 an illumination optical system disposed on an optical
4 path along which light irradiated on a mask from an annular
5 illumination source passes, said illumination optical system
6 including an optical member that changes an annular ratio of
7 the annular illumination source in accordance with a pattern
8 formed on the mask; and

9 a projection optical system disposed between the mask
10 and a substrate onto which the pattern is transferred.

1 29. (Amended) A projection exposure apparatus
2 comprising:

3 an illumination optical system disposed between a first
4 light source and a mask;

5 a projection system disposed between the mask and a
6 substrate; and
7 an optical device disposed within the illumination
8 optical system, that forms a plurality of secondary light
9 sources, including a substantially annular secondary light
10 source and a substantially circular secondary light source,
11 with light from the first light source, to illuminate the
12 mask with light from one of the plurality of secondary light
13 sources, the optical device changing an annular ratio of the
14 annular secondary light source and changing a size of the
15 circular secondary light source.

Please add the following claims:

--91. An apparatus according to claim 26, wherein said optical device includes an optical integrator and an optical element having a conical surface, disposed between said first light source and the optical integrator.--

-92. An apparatus according to claim 91, wherein said optical integrator includes a fly-eye type integrator or an internal reflection type integrator...

--93. An apparatus according to claim 26, wherein said optical device satisfies the following condition:

$0.45 \leq NA_2/NA_1 \leq 0.8$

wherein NA_1 is the numerical aperture of said projection optical system, and NA_2 is the numerical aperture

6 of said illumination optical system determined by the outer
7 diameter of said annular secondary light source.--

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1 --94. An apparatus according to claim 27, wherein said
2 illumination optical system includes an optical integrator
3 and a stop disposed adjacent to the optical integrator to
4 form said annular illumination source.--

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1 --95. An apparatus according to claim 27, wherein said
2 optical device changes the annular ratio of said annular
3 illumination source in accordance with a pattern on said
4 mask.--

1 --96. An apparatus according to claim 95, wherein said
2 optical device includes a plurality of annular stops having
3 annular ratios that are different from each other, one of
4 the plurality of annular stops selected in accordance with
5 said pattern being disposed on said optical path.--

1 --97. A projection exposure apparatus comprising:
2 an illumination optical system in which an internal
3 reflection type integrator is disposed on an optical axis to
4 illuminate a mask with light from a light source passing
5 through the internal reflection type integrator; and
6 a projection optical system through which light from
7 the mask passes;